

11/26/01
J1054 U.S. PTO

MAYER, BROWN & PLATT
P.O. Box 2828
Chicago, Illinois 60690-2828
(312) 782-0600

Direct Dial System: (312) 701-8609
Telecopier: (312) 701-7711

Attorney Docket No. 01925260

Assistant Commissioner for Patents
US Patent and Trademark Office
P.O. Box 2327
Arlington, VA 22202
Box PATENT APPLICATION

11-29-01 09/980220
JC07 Rec'd PCT/PTO 26 NOV 2001

Express Mail Mailing Label No. EL744230576 US
Date of Deposit: November 26, 2001

I hereby certify that this paper or fee is being deposited with the U.S. Postal Service "Express Mail Post Office to Addressee" service under C.F.R. §1.10 on the date indicated above and is addressed to the Box Patent Application, Assistant Commissioner for Patents, Washington, DC 20231.


Signature

Sir:

Transmitted herewith for filing in the U.S. Patent and Trademark Office is the patent application of inventor, Paulus Louis Guido Moers entitled METHOD FOR SELECTION OF A RECEIVER TUNING FREQUENCY. This application is being filed pursuant to 35 U.S.C. 371 as the national phase of the PCT filing claiming priority from European Patent Application No. EP99200525 filed May 25, 1999 and PCT Application Number PCT/EP00/01119 filed February 11, 2000 and published as WO 00/74237 A1.

1. [X] Enclosed is a specification 17 pages, including 2 independent claims and 10 claims total.
2. [X] Enclosed are the drawings - 3 Sheets of formal drawings.
3. [] An executed Assignment and an Assignment Recordation Cover Sheet are enclosed.
4. [X] An unexecuted Combined Declaration and Power of Attorney document is enclosed.
5. [X] Priority is claimed under 35 U.S.C. § 119 and 35 U.S.C. § 371 as a national phase submission to European Patent Application No. EP99200525 filed May 25, 1999 and PCT Application Number PCT/EP00/01119 filed February 11, 2000 and published as WO 00/74237 A1
6. [] Please AMEND the specification by inserting before the first line of the first page the following paragraph:
7. [X] The filing fee is calculated on the basis of the claims existing in the application and its status as a national phase submission under the PCT and 35 U.S.C. 3371.

Claims as Filed, Less Any Claims Cancelled by Amendment						
	(Col. 1)	(Col. 2)	SMALL ENTITY			OTHER THAN A SMALL ENTITY
FOR:	NO. FILED	NO. EXTRA	RATE	FEES		RATE FEE
BASIC FEE	XXXXXXX	XXXXXXX	445	\$0	or	890 \$890
TOTAL CLAIMS	10 - 20=	0	x9=	\$ 0	or	x18= \$ 0
INDEP CLAIMS	2 -3 =	0	x42=	\$ 0	or	x84= \$ 0
[0] MULTIPLE DEPENDENT CLAIM PRESENTED			+130=		or	+260= \$---
If the difference in Col. 1 is less than zero, enter "0" in Col. 2			TOTAL	\$		TOTAL \$890 00

8. [X] Enclosed is a check in the amount of \$890.00 to cover the filing fee for this application as a submission under the National Phase of the PCT pursuant to 35 U.S.C. 371. If there are any additional fees due in connection with the filing of this application, please charge these additional fees to our Deposit Account No. 13-0019.

09/980220
JC10 Rec'd PCT/PTO 26 NOV 2001

9. [X] The Commissioner is hereby authorized to charge payment of the following fees during the pendency of this application or credit any overpayment to deposit Account No. 13-0019. A duplicate copy of this sheet is attached.

[X] Any patent application processing fees under 37 CFR §§ 1.16 or 1.17.

[] The issue fee set in 37 CFR § 1.18 at or before mailing of the Notice of Allowance, pursuant to 37 CFR § 1.311(b).

10. [X] Preliminary Amendment.

11. [X] Enclosed is a Return Post Card.

12. [X] Information Disclosure Statement.

13. [] Applicant and/or assignee is an independent inventor or small entity for purposes of paying reduced fees

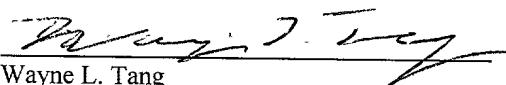
14. [] Applicant requests pursuant to 35 U.S.C. 122(6)(2)(B)(i) not to publish this application. A copy of Form PTO/SB/35 is attached.

15. [X] Enclosed are the PCT application and International Search Report.

Please address all telephone calls to Wayne L. Tang at telephone No. (312) 701-8609 and address all correspondence to:

Wayne L. Tang
MAYER, BROWN & PLATT
P.O. Box 2828
Chicago, Illinois 60690-2828

Respectfully submitted,

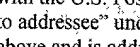

Wayne L. Tang
Reg. No. 36,028

Dated: November 26, 2001

09/980220
JC10 Rec'd PST/PTD 26 NOV 2001

PATENT
ATTY. DKT. NO. 01925260
EMARK OFFICE

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:)
PAULUS L. G. MOERS) Group Art Unit:
Serial No.:) Examiner:
Filing Date: November 26, 2001) CERTIFICATE OF MAIL
For: METHOD FOR SELECTION OF A) "Express Mail" mailing
RECEIVER TUNING FREQUENCY) Date of Deposit: November 26, 2001
I hereby certify that the above and is addressed to addressee" under 37
Patents, Washington, D.C.

Signature

Assistant Commissioner for Patents
Washington, D.C., 20231

Sir:

PRELIMINARY AMENDMENT

Applicant respectfully requests entry of the following amendment:

In The Specification:

Page 1, prior to line 1 insert -- Field of Invention --

Page 1, prior to line 6, insert -- Background of Invention --

Page 2, prior to line 18, insert -- Summary of Invention --

Page 5, prior to line 7, insert -- Brief Description of Drawings

Page 5, line 20, insert -- Description Of The Preferred Embodiment

In The Claims:

Cancel claims 1-10 without prejudice

Please add the following new claims:

11. (new) A method for selecting a tuning frequency for receiving an RF transmitter within an RF frequency band, the method comprising:

performing a band scanning search to detect transmitters exceeding a predetermined

reception quality level;

storing the tuning data for the detected transmitters;

allocating a permanency factor indicating the permanency in reception quality for the transmitters exceeding the predetermined reception quality level; and

selecting a tuning frequency on the basis of the permanency factor.

12. (new) A method according to claim 11 wherein the band scanning search is repeated in subsequent scan cycles, and each detected transmitter increasing or decreasing respectively in permanency factor depending on the detection or the absence of detection respectively in subsequent scan cycles.

13. (new) A method according to claim 12 further comprising erasing the tuning data of transmitters having a permanency factor decreasing below a predetermined permanency threshold level.

14. (new) A method according to claim 11 further comprising selecting an RF transmitter from the detected transmitters carrying audio programs belonging to a predetermined PTY category.

15. (new) A method according to claim 11 further comprising selecting an RF transmitter from the detected FM transmitters carrying traffic messages on the basis of field strength.

16. (new) An FM receiver comprising:

- a first tuner circuit for receiving a first FM transmitter;
- a second tuner circuits for detecting FM transmitter signals received with a reception quality exceeding a predetermined quality threshold level in an FM band;
- storage means for storing the tuning data of the detected FM transmitters, wherein the first tuner circuit switches over from an actually received first FM transmitter to a second FM transmitter selected from the detected FM transmitters when the reception quality of the first FM transmitter decreases below a predetermined level;
- a processing unit which allocates a permanency factor indicating the permanency in reception quality to each detected FM transmitter, and wherein the selection of the second FM transmitter is based on the permanency factor.

17. (new) An FM receiver according to claim 16, further comprising a tuning control means for varying the tuning of the second tuner circuit to repeat the band scanning search in

subsequent scan cycles and wherein the processing unit increases stepwise the permanency factor of the transmitter at each detection or decreases the permanency factor stepwise in the absence of detection of the transmitter in a subsequent scan cycle.

18. (new) An FM receiver according to claim 17, wherein the storage locations of the tuning data relating to transmitters decreasing in permanency factor below a predetermined permanency threshold level are released for storage of other transmitter data in the storage means.

19. (new) An FM receiver according to claim 16 wherein the FM receiver is capable of receiving RDS signals and wherein when selecting the second FM transmitter, the processing unit continuously monitors the permanency factor of the FM transmitters carrying an audio program in the same PTY category as the audio program of the first FM transmitter.

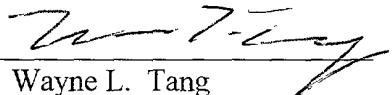
20. (new) An FM receiver according to claim 16 wherein the FM receiver is capable of receiving RDS signals, and wherein the processing unit operates to monitor the permanency factor of FM transmitters carrying traffic message information as well as the field strength thereof, the second FM transmitter being selected from the detected FM transmitters upon receiving a traffic announcement signal on the basis of field strength.

REMARKS

Applicant is filing this preliminary amendment to modify the claims to place them in better condition for examination and to remove the original claims from multiple dependent format. Applicant respectfully submits that these amendments are not made for the purpose of patentability.

The Office is authorized to charge all fees, if any, associated with this Amendment to Deposit Account No. 13-0019.

Respectfully submitted,

By: 
Wayne L. Tang
Reg. No. 36,028

MAYER, BROWN & PLATT
P.O. Box 2828
Chicago, Illinois 60690-2828
312/782-0600

Dated: November 26, 2001

Method for selection of a receiver tuning frequency

The invention relates to a method for selecting a tuning frequency for receiving an RF transmitter within an
5 RF frequency band and an FM receiver executing the method.

An FM receiver executing the above method is on itself known e.g. from European Patent 0 333 194. The known FM receiver complies with the FM RDS broadcasting standard as defined in 'Specification of the Radio Data System FM RDS
10 for VHF-FM Sound Broadcasting' by the European Broadcasting Union (EBU), EBU document Tech 3244-E, March 1984 and updated in the subsequent revisions thereof. Reference is made to this document for a correct understanding of the meaning and definition of the various terms used hereinafter
15 in connection with the FM RDS standard.

The cited FM receiver comprises a first or stationary tuner circuit and a second or scanning tuner circuit. The stationary tuner circuit is used to tune the receiver to a broadcast transmitter station with a wanted audio program,
20 hereinafter indicated as first transmitter frequency, and to process the audio program signals for sound reproduction. If the transmitter transmits RDS data as well, then the stationary tuner circuit will also extract the RDS data carried by the received RDS transmitter signal, in
25 particular a list of alternative frequencies (AFs). Such list provides tuning data of transmitters carrying the same program as the one the stationary tuner circuit is actually tuned to. The scanning tuner circuit is used to monitor the reception quality of the transmitter signals at each of
30 those AFs. For this, the scanning tuner circuit is sequentially switched to each AF in the AF list to measure the fieldstrength of the transmitter signals at the respective AFs. The fieldstrength information is stored in a memory and repeatedly updated in sequential scan cycles. On
35 deterioration of the received stationary transmitter signal, hereinafter indicated as first transmitter frequency, the

stationary tuner circuit is automatically switched over in its tuning from said first transmitter frequency to another transmitter frequency, hereinafter indicated as second transmitter frequency. In the known receiver, the AF stored 5 in the memory having highest fieldstrength is chosen to be such second transmitter frequency. However, the reception quality measurement is based on the momentary fieldstrength of the RF FM reception signal and the AF having highest fieldstrength at the moment of tuning switch over may lose 10 this position very quickly, due to fluctuations in the environmental reception conditions. This may cause instabilities in the tuning of the receiver. Furthermore, in this known receiver, the selection of a second transmitter frequency is limited to the AFs included in the RDS AF list, 15 being alternative frequencies carrying the same audio program as the first transmitter frequency.

An object of the invention is to improve the tuning behaviour of the above mentioned receiver.

To this end, a method for selecting a tuning frequency 20 for receiving an RF transmitter within an RF frequency band is characterized by a band scanning search for detecting transmitters exceeding a predetermined reception quality level, by storing the tuning data thereof and allocating thereto a permanency factor indicating the permanency in 25 reception quality thereof, said tuning frequency being selected on the basis of at least said permanency factor.

An FM receiver executing the method according to the invention comprising first and second tuner circuits 30 respectively for receiving a first FM transmitter and for detecting in an FM band FM transmitters received with a reception quality exceeding a predetermined quality threshold level, and storage means for storing the tuning data of the so detected FM transmitters, the first tuner 35 circuit switching over from an actually received first FM transmitter to a second FM transmitter selected from the

detected FM transmitters when the reception quality of the first FM transmitter decreases below a predetermined level, is therefore characterized by a processing unit allocating to each detected FM transmitter a permanency factor
5 indicating the permanency in reception quality thereof, said selection of the second FM transmitter being based on at least said permanency factor.

By the measure according to the invention the criteria for selecting a second transmitter are not only based on the 10 reception quality or fieldstrength thereof, but also on the duration or permanency of the reception quality. The longer the reception quality is in excess of said predetermined minimum level, the more reliable and stable the reception of the transmitter signal in question is. By tuning the 15 stationary tuner circuit to such a transmitter, the tuning behaviour of the stationary tuner will be stabilised.

To allow easy implementation, the method is preferably characterized in that the band scanning search is being repeated in subsequent scan cycles, each detected 20 transmitter increasing respectively decreasing in permanency factor dependent on the detection respectively the absence of detection thereof in subsequent scan cycles.

An FM receiver executing said preferred method is characterized by tuning control means controlling the tuning 25 of the second tuning circuit to repeat the band scanning search in subsequent scan cycles, the processing unit increasing, respectively decreasing, stepwise the permanency factor of a transmitter at each detection, respectively in the absence of detection, thereof in a subsequent scan 30 cycle.

In a further preferred method the tuning data of transmitters having a permanency factor decreasing below a predetermined permanency threshold level are being erased to exclude such transmitters from being selected.

35 An FM RDS receiver executing said preferred method is characterized in that the storage locations of tuning data

relating to transmitters decreasing in permanency factor below a predetermined permanency threshold level, being released for storage of other transmitter data.

5 This measure further improves the efficiency in the use of memory capacity without losing the information which transmitter frequency should be chosen in case the actually received transmitter signal decreases below said predetermined threshold level.

10 Furthermore, the band scanning search will reveal all transmitters in the FM band meeting the minimum reception quality requirement. This allows to apply said selection of the second transmitter frequency also when changes in the audio program are permitted or wanted. Dependent on the user's choice, such second transmitter frequency may carry 15 an audio program signal different from the actually received one, but falling e.g. within the same PTY category, and/or including traffic messages. The selection is therewith PTY determined. RDS program codes may be used for the identification of such audio programs.

20

In an FM receiver capable of receiving RDS signals implementing such selection the processing unit repeatedly monitors the permanency factor of the FM transmitters carrying an audio program within the same PTY category as 25 the audio program of the first FM transmitter.

In another preferred method according to the invention the second transmitter is selected from FM transmitters carrying traffic messages on the basis of fieldstrength in addition to the permanency factor.

30

In an FM receiver capable of receiving RDS signals executing this method the processing unit operates to monitor the permanency factor of FM transmitters carrying traffic message information as well as the fieldstrength thereof, the second FM transmitter being selected from the 35 detected FM transmitters upon receiving a traffic

announcement signal on the basis of fieldstrength in addition to the permanency factor.

The fieldstrength is used in this measure to identify the nearest transmitter sending traffic messages, which are 5 most relevant to the actual location of the user because of the proximity of the transmitter.

These and further aspects and advantages of the invention will be discussed in more detail hereinafter with 10 reference to the disclosure of preferred embodiments, and in particular with reference to the appended Figures that show:

Figure 1 a blockdiagram of a dual tuner FM RDS receiver according to the invention;

Figure 2 an organisational scheme of the list of 15 transmitter related data as stored in the FM RDS receiver of Figure 1;

Figure 3 a flowchart illustrating the method according to the invention as being executed by the FM RDS receiver of Figure 1.

20 Figure 1 shows a blockdiagram of an FM receiver according to the invention, which in the preferred embodiment as shown complies with the FM RDS broadcasting standard as defined in above cited EBU document. Reference 25 is made to this document for detailed information on the meaning and definition of the various terms and abbreviations relating to the RDS standard, as mentioned hereinafter.

The FM receiver receives RF FM signals through an 30 antenna 1 and following this antenna 1, it comprises first and second tuner circuits 2 and 3, the tuning frequency thereof being controlled from tuning control means 10, 11, 25. The tuning control means 10, 11, 25 comprise a central 35 processing unit (CPU) 25 and an I/O control module 11 being included in a microprocessor 12 and connected through a control bus 10 to the first and second tuner circuits 2 and

3. By manual operation of one of keys 21-24 the tuning frequency of the first tuner circuit 2 can be set through a user interface I/O module 20 to the transmitter frequency f_t of a wanted FM broadcast station. Key 21 is to activate an 5 autostore functionality, key 22 is to activate an up/down search, key 23 is to switch on/off the reception of traffic messages and key 24 is to activate a search for programs within the same PTY category as the one actually received. These functionalities require the use of a program memory 26 10 for the storage of program software and a timer module 28 and are on themselves already known from e.g. the FM RDS radio receiver type VDO RC 959 RDS. The first tuner circuit 2 provides for the stationary selection and demodulation of a wanted RF FM broadcast signal into baseband and comprises 15 means to measure the reception quality of the received FM RF signal. A quality factor reflecting said reception quality is supplied via a quality level line 14 to an AD converter module 15 of the microprocessor 12 to be further processed as described hereinafter.

20 Dependent on the content of the received FM broadcast signals, the baseband FM modulation signal may comprise an RDS signal and/or a mono or stereomultiplex signal. This baseband signal is supplied via a signal line 5 from an output of the first tuner circuit 2 to a digital signal 25 processor 6. The digital signal processor 6 comprises audio signal processing means (not shown) to process mono audio signals and eventually demultiplex stereomultiplex signals into stereo left and right audio signals. These stereo left and right audio signals are supplied to an audio amplifier 8 30 and subsequently to a stereo loudspeaker set 9 for respectively amplification and reproduction thereof.

The digital signal processor 6 is coupled to an RDS decoder 7 to decode RDS data contained in the received FM broadcast signal. The decoded RDS data are supplied via an 35 RDS data line 18 to an RDS data I/O module 19 of the

microprocessor 12. RDS data processing occurs under control of the CPU 25 of the microprocessor 12.

The tuning frequency of the second tuner circuit 3 is automatically varied by the tuning control means 10, 11, 25 5 to scan over the full RF FM broadcast reception band ranging from 87.5 MHz to 108 MHz, starting from e.g. the lower end of said RF FM band. The scanning operation will be interrupted upon first reception of an FM broadcast station fx having a signal reception quality exceeding a certain 10 predetermined threshold level qt (hereinafter also indicated as scan hit). During an interruption interval, measurement, processing and storage steps are being made under control of the CPU 25, as described in the following with reference to Figure 2.

15 1. the tuning data of fx is stored at a storage address Tx of a data memory 27 of the microcontroller 12;

... 2. a permanency factor px is being allocated to fx, set at unity value and stored at Tx;

20 3. the actual reception fieldstrength is measured and a fieldstrength factor sx reflecting said reception fieldstrength is stored at Tx;

An RDS decoder 4 following the output of the second tuner circuit 3 is to extract RDS data from the demodulated 25 RDS signal, if fx is carrying such RDS data. The RDS data is supplied via an RDS data line 16 to an RDS data I/O module 17 of the microprocessor 12 and the various program related RDS codes included therein, such as e.g. the PTY-, TA-, TMC-, PS-, and/or PS Mask codes, are stored in said data memory 30 at the storage address Tx of fx. Eventually an RDS flag NW identifying RDS transmitters with value 1 and non-RDS transmitters with value 0 may be stored in TX as well.

After these steps have been completed for fx, the scanning is resumed until it is interrupted again, when the 35 next FM broadcast station fy in the RF FM broadcast reception band having a signal reception quality exceeding

qt is detected. The above measurement, processing and storage steps are repeated for fy, the tuning data thereof, as well as a permanency factor py and a fieldstrength factor sy, eventually along with RDS program data are being stored 5 in the data memory at storage address Ty. These steps are repeated for each such FM broadcast station until the full RF FM broadcast reception band has been scanned, whereafter the scanning operation is repeated, either in the same or in reversed scan direction.

10 The reception quality may be based on one or more parameters, such as e.g. the reception fieldstrength, the (lack of) multipath and other environmental sources of pollution. The above predetermined threshold level qt is chosen such, that RF FM broadcast signals exceeding this 15 level can be processed properly without giving rise to receiver malfunctioning and/or noticeable signal distortions.

For a practical implementation of the detection of FM broadcast stations having a signal reception quality 20 exceeding a certain predetermined threshold level qt, reference is made to above cited car radio receiver type VDO RC 959 RDS, where a similar feature is used under its so-called autostore functionality. Said known receiver also provides a reference for the measuring of the actual 25 reception fieldstrength of certain transmitters and the storage of a fieldstrength factor sx reflecting said reception fieldstrength, the retrieval of various program related RDS codes included in the received RF FM signal, such as e.g. the PTY, TA-, TMC-, PS-, and/or PS Mask codes 30 and the storage of these data in a data memory at storage addresses related to the relevant transmitter frequencies. The known receiver is based on a single tuner concept and provides said functionalities during short muting intervals 35 in the reproduction of the main audio program being limited to AFs only, i.e. transmitter frequencies carrying the same audio program as the stationary received one.

If in a subsequent scan operation fx is detected again, which means that the reception quality of fx still exceeds the predetermined threshold level qt , then the permanency factor px is incremented with unity value, thus resulting in 5 $px=2$. A maximum to the permanency factor can be set, e.g. at three, which means that any scan hits on fx following up to the third one in a row will have no effect on this maximum value of $px=3$.

If after a scan hit, fx fails to appear in a subsequent 10 scan (hereinafter also indicated as an empty scan), then px will decrement with unity value, each time a subsequent scan appears to be empty on fx . The minimum value of px is set at $px=0$, which is obtained in at most three empty scans in a 15 row. Any empty scan following the third one in a row, will have no effect on this minimum value of $px=0$. If px decreases below a permanency threshold level, which in this receiver is set at $px=1$ (unity), then all data in the data memory at the storage address Tx of fx will be removed. This 20 removal of data is in practise effected by releasing the relevant storage locations for the storage of new data.

As long as px differs from zero, the last measured fieldstrength factor sx is stored at the storage address Tx of fx , while overwriting the prior one.

In contrast with said known receiver, the second tuner 25 circuit 3 of the FM receiver according to the invention collects not only transmitter data of AFs only, but of all transmitters exceeding the predetermined reception quality level qt . This allows to offer the user a broader range of options in automatically selecting audio programs.

30 For instance, by activating the 'autostore' option with key 21, the fieldstrength factor of the various transmitters stored in the data memory may be compared with a certain threshold level, chosen such that it is exceeded by only a limited number of transmitters (e.g. 10), which can be RDS- 35 or non-RDS transmitters. The tuning data of these transmitters are stored in the autostore memory and called

up by touching the key 21. According to the invention the threshold level may be based on a predetermined threshold value for the permanency factor, eventually in combination with a predetermined threshold value for the fieldstrength factor.

5 This also applies to the threshold level for use in the up/down search of transmitters, which feature can be activated with key 22.

The various program related RDS codes like PTY, TP and TA are used to offer the user options in automatically 10 selecting within the category of programs indicated therewith, the best receivable transmitter from those having these codes stored in the data memory of the receiver. The availability of the tuning data of all receivable transmitters in the data memory of the receiver, together 15 with the permanency factor and the fieldstrength factor thereof allow to immediately identify within a certain RDS program category, which in terms of these factors is the best to receive transmitter.

A switching of the tuning of the first tuner circuit 2 20 to the best to receive transmitter carrying a program within the same PTY category as the one the first tuner is actually tuned to, is activated with key 24.

By an operation of key 23, the receiver can be set to 25 reproduce traffic messages. In accordance with the invention, the criterium to select an appropriate traffic message transmitting RDS broadcast station amongst those carrying the traffic announcement flag is based on the permanency factor, i.e. the best to receive RDS traffic message broadcast station having the highest permanency 30 factor. If the highest permanency factor is shared by various transmitters, then the fieldstrength factor may additionally be used to come to the one best to receive. The transmitter received strongest (i.e. with highest fieldstrength) is in practice nearest to the receiver 35 location and the traffic messages of that transmitter are therewith most relevant to the user.

Figure 3 shows a flowchart of an algorithm for collecting and updating transmitter and RDS program related data to be used in a method for tuning the reception of 5 radio broadcast signals to an FM transmitter in accordance with the invention, in which steps a1-a15 have the following meaning:

a1 Switching on the radio and starting the method according to the invention.

10 for selecting a tuning frequency for receiving an RF FM transmitter within an RF FM frequency band

a2 The second tuner circuit 3 is initialised for starting a scan cycle from the lower end of the FM frequency band at 87.5 MHz. The data memory 27 is 15 initialised for transmitter and RDS program related data storage .

a3 The tuning frequency of the second tuner circuit 3 is being increased to scan the FM and interrupted upon reception of a transmitter fx. During 20 an interruption period the signal reception quality (this can be the fieldstrength or other parameters defining the reception quality level) of fx is measured. In the following the fieldstrength is taken as a measure for the reception quality. Store a 25 fieldstrength factor sx reflecting the fieldstrength of fx at a storage address Tx of the data memory 27.

a4 If the fieldstrength factor sx exceeds the threshold level qt then go to a9. Otherwise go to a5.

a5 The fieldstrength factor sx is not good 30 enough. Check now the permanency factor px of fx. If this px is not equal to zero (which means fx has been detected in at least the preceding scan), then goto a6. If px=0 then goto a7.

a6 Decrement px with unity value.

35 a7 px=0: clear all data from the storage address Tx of the data memory 27.

a8 Resume the scanning operation. If the end of the FM band (108.0 MHz) is reached, go to a3 to start a subsequent scan cycle, starting again from the lower end of the FM band (87.5 MHz).

5 a9 The fieldstrength factor sx exceeds qt. Wait some time to check whether fx carries RDS information.

a10 Is the PI code received. If so, go to a11, otherwise go to a12.

10 a11 Set the RDS flag NW at 1 and store all RDS data at Tx of data memory 27.

a12 Check the RDS flag NW at Tx. If NW=1, go to a13, otherwise go to a14.

a13 Clear the RDS flag by setting NW to 0.

a14 Clear all RDS data at Tx

15 a15 The reception quality was OK. Increment px with unity value (until maximum at px=3 has been reached).

The data memory 27 therewith contains at any time the 20 most recent status of the receivable transmitters in the FM band in terms of momentary reception quality or fieldstrength sx and permanency or stability of reception quality px. The continuous availability of the abovementioned transmitter related data in an FM receiver 25 according to the invention allows to determine immediately which transmitter within the FM band provides optimal reception conditions, i.e. which transmitter within the FM band has highest permanency factor px. If the highest px value is shared by several transmitters, then the 30 fieldstrength factor sx may be taken additionally to determine the best to receive transmitter. The availability of program related RDS data allows to restrict the group of transmitters to be considered for the above determination of the best to receive transmitter. If, for instance, the user 35 is only interested in hearing a specific audio program with optimal quality, then in accordance with the invention it

should be determined, which transmitter having the PI code identifying said specific audio program has highest permanency factor p_x amongst those detected within the FM band. Similarly, the group of transmitters to be considered 5 for the above determination in case the user is interested in any audio program within a certain PTY category, is limited to those transmitter carrying the RDS PTY code of said category. Accordingly, in determining the best to receive traffic message broadcast transmitter station, use 10 can be made of the RDS TA code to limit the group of transmitters to be considered therefor.

The invention is not restricted to the embodiments described above and may well be used in e.g. a non-RDS receiver for implementing an 'autostore' functionality, 15 wherein a number of strongest transmitters are being stored under a same number of tuner preselection keys. Furthermore, the functions of the first and second tuner circuits 2 and 3 may well be performed with a single tuner, in which the stationary reception is repeatedly shortly interrupted to 20 allow the tuner during each interruption period to scan through a part of the FM band covering the whole FM band after a number of interruption periods.

Claims:

1. Method for selecting a tuning frequency for receiving an RF transmitter within an RF frequency band characterized by a band scanning search for detecting transmitters exceeding a predetermined reception quality level, by storing the tuning data thereof and allocating thereto a permanency factor indicating the permanency in reception quality thereof, said tuning frequency being selected on the basis of at least said permanency factor.

2. Method according to claim 1, characterized in that the band scanning search is being repeated in subsequent scan cycles, each detected transmitter increasing respectively decreasing in permanency factor dependent on the detection respectively the absence of detection thereof in subsequent scan cycles.

3. Method according to claim 2, characterized by erasing the tuning data of transmitters having a permanency factor decreasing below a predetermined permanency threshold level.

4. Method according to one of claims 1 to 3, characterized by an RF transmitter being selected from detected transmitters carrying audio programs belonging to a predetermined PTY category.

5. Method according to one of claims 1 to 3, characterized by an RF transmitter being selected from detected FM transmitters carrying traffic messages on the basis of fieldstrength in addition to the permanency factor.

6. FM receiver comprising first and second tuner circuits respectively for receiving a first FM transmitter and for detecting in an FM band FM transmitters received with a reception quality exceeding a predetermined quality threshold level, and storage means for storing the tuning data of the so

detected FM transmitters, the first tuner circuit switching over from an actually received first FM transmitter to a second FM transmitter selected from the detected FM transmitters when the reception quality of the first FM transmitter decreases below a predetermined level, characterized by a processing unit allocating to each detected FM transmitter a permanency factor indicating the permanency in reception quality thereof, said selection of the second FM transmitter being based on at least said permanency factor.

7 FM receiver according to claim 6, characterized by tuning control means varying the tuning of the second tuner circuit to repeat the band scanning search in subsequent scan cycles, the processing unit increasing, respectively decreasing, stepwise the permanency factor of a transmitter at each detection, respectively in the absence of detection, thereof in a subsequent scan cycle.

8 FM receiver according to claim 7, characterized in that the storage locations of tuning data relating to transmitters decreasing in permanency factor below a predetermined permanency threshold level, being released for storage of other transmitter data.

9 FM receiver according to one of claims 6 to 8 capable of receiving RDS signals, characterized in that in selecting the second FM transmitter the processing unit continuously monitors the permanency factor of the FM transmitters carrying an audio program in the same PTY category as the audio program of the first FM transmitter.

10. FM receiver according to claim 6 or 8 capable of receiving RDS signals, characterized in that the processing unit operates to monitor the permanency factor of FM transmitters carrying traffic message information as well as the fieldstrength thereof, the

second FM transmitter being selected from the detected FM transmitters upon receiving a traffic announcement signal on the basis of fieldstrength in addition to the permanency factor.

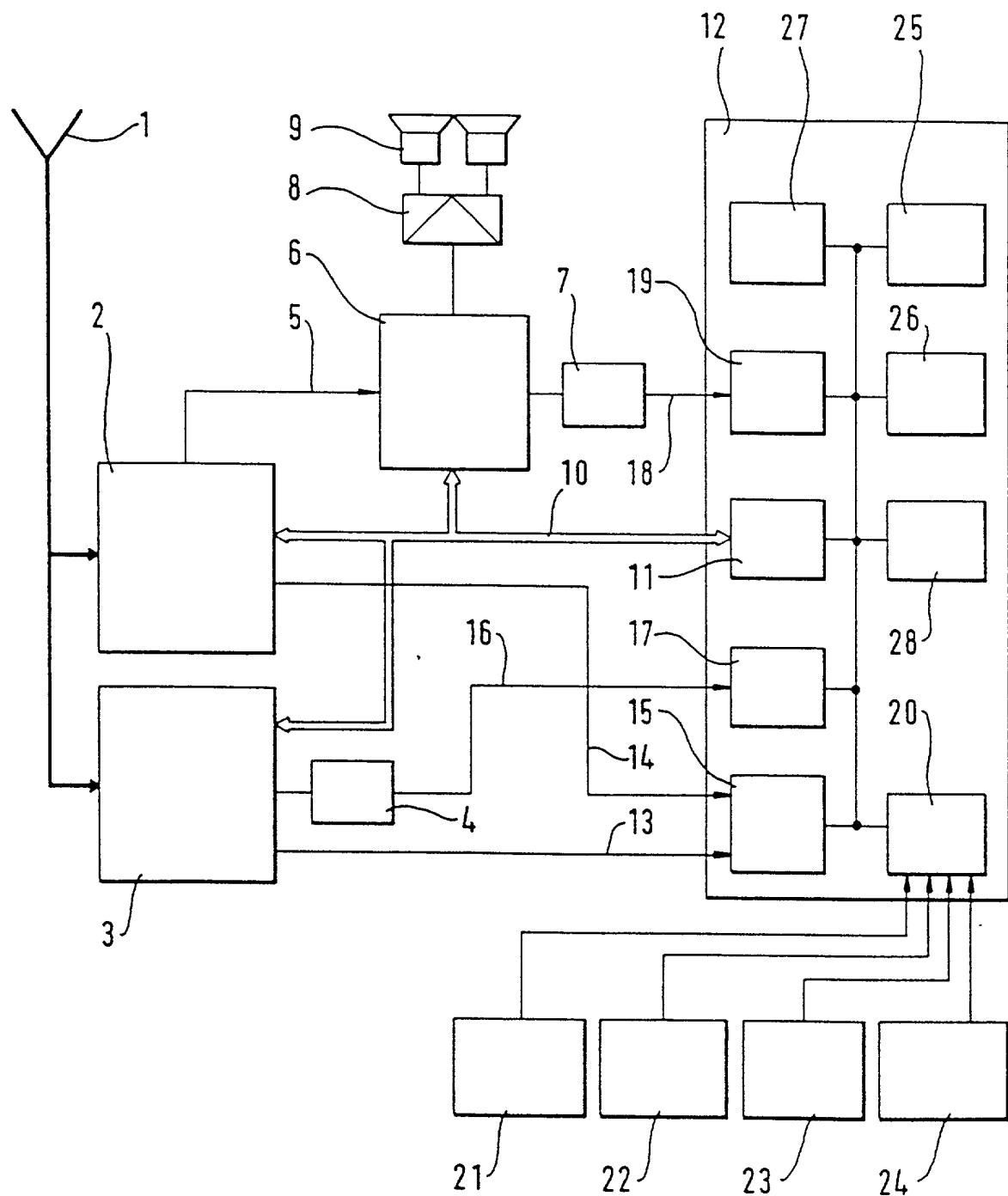


Fig. 1

RDS freq 0 (875 MHz)		RDS freq 205 (108.0 MHz)	
T...	T1	T2	Tx
Ty			
	<p>11 p1:1 NW:0 s1:16</p>	<p>12 p2:3 NW:1 s2:14</p>	<p>tx px:1 NW:1 sx:16</p>
			<p>ty py:2 NW:1 sy:12</p>
			<p>PI = 8301, PTY = 2, TA = 1, TMC = 0, PS = "Radio 3", PS_MASK</p>
		<p>PI = 8410 PTY = 0, TA = 0, TMC = 0, PS = "BRAB./Z0", PS_MASK</p>	<p>PI = 8301, PTY = 2, TA = 1, TMC = 0, PS = "Radio 3", PS_MASK</p>

Fig. 2

3 / 3

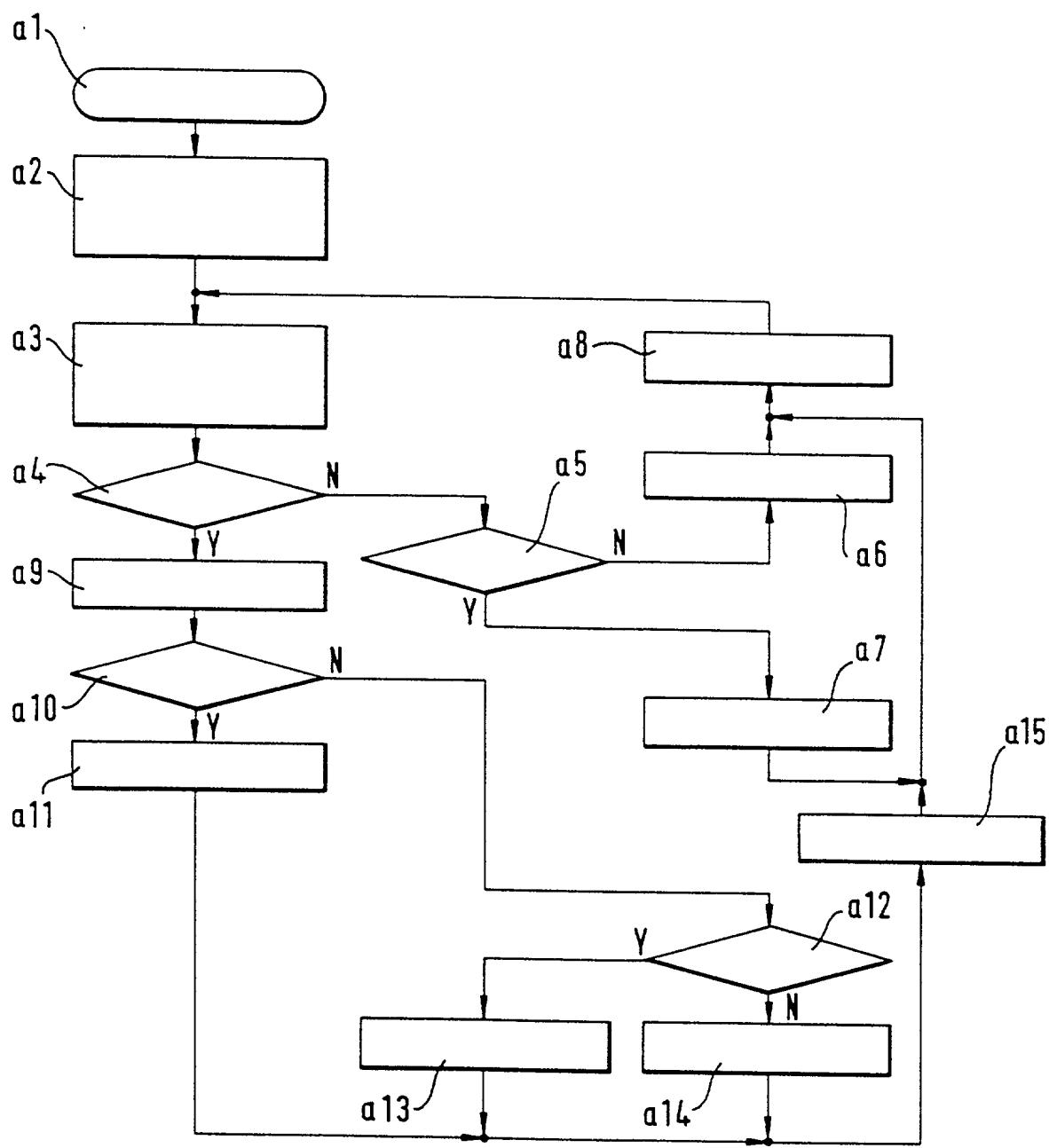


Fig. 3

Declaration and Power of Attorney For Patent Application
Erklärung Für Patentanmeldungen Mit Vollmacht
 German Language Declaration

Als nachstehend benannter Erfinder erkläre ich hiermit an Eides Statt:

dass mein Wohnsitz, meine Postanschrift, und meine Staatsangehörigkeit den im Nachstehenden nach meinem Namen aufgeführten Angaben entsprechen,

dass ich, nach bestem Wissen der ursprüngliche, erste und alleinige Erfinder (falls nachstehend nur ein Name angegeben ist) oder ein ursprünglicher, erster und Miterfinder (falls nachstehend mehrere Namen aufgeführt sind) des Gegenstandes bin, für den dieser Antrag gestellt wird und für den ein Patent beantragt wird für die Erfindung mit dem Titel:

Verfahren zur Auswahl einer Empfängerabstimmfrequenz

deren Beschreibung

(zutreffendes ankreuzen)

hier beigefügt ist.

am 11.02.2000 als

PCT internationale Anmeldung

PCT Anmeldungsnummer PCT/EP00/01119

eingereicht wurde und am

abgeändert wurde (falls tatsächlich abgeändert).

Ich bestätige hiermit, dass ich den Inhalt der obigen Patentanmeldung einschliesslich der Ansprüche durchgesehen und verstanden habe, die eventuell durch einen Zusatzantrag wie oben erwähnt abgeändert wurde.

Ich erkenne meine Pflicht zur Offenbarung irgendwelcher Informationen, die für die Prüfung der vorliegenden Anmeldung in Einklang mit Absatz 37, Bundesgesetzbuch, Paragraph 1.56(a) von Wichtigkeit sind, an.

Ich beanspruche hiermit ausländische Prioritätsvorteile gemäss Abschnitt 35 der Zivilprozessordnung der Vereinigten Staaten, Paragraph 119 aller unten angegebenen Auslandsanmeldungen für ein Patent oder eine Erfindersurkunde, und habe auch alle Auslandsanmeldungen für ein Patent oder eine Erfindersurkunde nachstehend gekennzeichnet, die ein Anmelde-datum haben, das vor dem Anmeldedatum der Anmeldung liegt, für die Priorität beansprucht wird.

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name,

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

Method for selection of a receiver tuning frequency

the specification of which

(check one)

is attached hereto.

was filed on 11.02.2000 as

PCT international application

PCT Application No. PCT/EP00/01119

and was amended on _____

(if applicable)

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations, §1.56(a).

I hereby claim foreign priority benefits under Title 35, United States Code, §119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

German Language Declaration

Prior foreign applications
Priorität beansprucht

Priority Claimed

<u>99200525.6</u>	<u>EP</u>	<u>26.05.1999</u>	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No
(Number) (Nummer)	(Country) (Land)	(Day Month Year Filed) (Tag Monat Jahr eingereicht)	Ja	Nein
 (Number) (Nummer)	 (Country) (Land)	 (Day Month Year Filed) (Tag Monat Jahr eingereicht)	 <input type="checkbox"/> Yes	 <input type="checkbox"/> No
 (Number) (Nummer)	 (Country) (Land)	 (Day Month Year Filed) (Tag Monat Jahr eingereicht)	 <input type="checkbox"/> Yes	 <input type="checkbox"/> No

Ich beanspruche hiermit gemäss Absatz 35 der Zivilprozeßordnung der Vereinigten Staaten, Paragraph 120, den Vorzug aller unten aufgeführten Anmeldungen und falls der Gegenstand aus jedem Anspruch dieser Anmeldung nicht in einer früheren amerikanischen Patentanmeldung laut dem ersten Paragraphen des Absatzes 35 der Zivilprozeßordnung der Vereinigten Staaten, Paragraph 122 offenbart ist, erkenne ich gemäss Absatz 37, Bundesgesetzbuch, Paragraph 1.56(a) meine Pflicht zur Offenbarung von Informationen an, die zwischen dem Anmelde datum der früheren Anmeldung und dem nationalen oder PCT internationalen Anmelde datum dieser Anmeldung bekannt geworden sind.

I hereby claim the benefit under Title 35, United States Code, §120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, §122, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, §1.56(a) which occurred between the filing date of the prior application and the national or PCT international filing date of this application.

<u>PCT/EP00/01119</u>	<u>11.02.2000</u>	<u>anhängig</u>	<u>pending</u>
(Application Serial No.) (Anmeldeseriennummer)	(Filing Date D, M, Y) (Anmelde datum T, M, J)	(Status) (patentiert, anhängig, aufgegeben)	(Status) (patented, pending, abandoned)
 (Application Serial No.) (Anmeldeseriennummer)	 (Filing Date D, M, Y) (Anmelde datum T, M, J)	 (Status) (patentiert, anhängig, aufgegeben)	 (Status) (patented, pending, abandoned)

Ich erkläre hiermit, dass alle von mir in der vorliegenden Erklärung gemachten Angaben nach meinem besten Wissen und Gewissen der vollen Wahrheit entsprechen, und dass ich diese eidesstattliche Erklärung in Kenntnis dessen abgebe, dass wissentlich und vorsätzlich falsche Angaben gemäss Paragraph 1001, Absatz 18 der Zivilprozeßordnung der Vereinigten Staaten von Amerika mit Geldstrafe belegt und/oder Gefängnis bestraft werden können, und dass derartig wissentlich und vorsätzlich falsche Angaben die Gültigkeit der vorliegenden Patentanmeldung oder eines darauf erteilten Patentes gefährden können.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true, and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

German Language Declaration

VERTRETUNGSVOLLMACHT: Als benannter Erfinder beauftrage ich hiermit den nachstehend benannten Patentanwalt (oder die nachstehend benannten Patentanwälte) und/oder Patent-Agenten mit der Verfolgung der vorliegenden Patentanmeldung sowie mit der Abwicklung aller damit verbundenen Geschäfte vor dem Patent- und Warenzeichenamt: (Name und Registrationsnummer anführen)

POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith. (list name and registration number)

Customer No. _____

And I hereby appoint

Telefongespräche bitte richten an:
(Name und Telefonnummer)

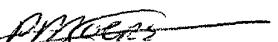
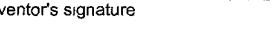
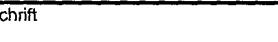
Direct Telephone Calls to: (name and telephone number)

Ext. _____

Postanschrift:

Send Correspondence to:

Mayer, Brown & Platt
190 South La Salle Street 60603-3441 Chicago, Illinois
 Telephone: +1 312 782 0800 and Facsimile +1 312 701 7711
 or
 Customer No. _____

Voller Name des einzigen oder ursprünglichen Erfinders: Paulus Louis Guido Moers		Full name of sole or first inventor: Paulus Louis Guido Moers	
Unterschrift des Erfinders 	Datum 7-12-01	Inventor's signature 	Date 7-12-01
Wohnsitz Eindhoven, Niederlande	Residence Eindhoven, NETHERLANDS		
Staatsangehörigkeit NL	Citizenship NL		
Postanschrift Opwettensmolen 350 Jonathan, 22	Post Office Address Opwettensmolen 350 Jonathan, 22		
NL-5612 Eindhoven NL-5688 VX Oirschot NETHERLANDS	NL-5612 Eindhoven NL-5688 VX Oirschot NETHERLANDS		
Voller Name des zweiten Miterfinders (falls zutreffend):		Full name of second joint inventor, if any:	
Unterschrift des Erfinders 	Datum 7-12-01	Second Inventor's signature 	Date 7-12-01
Wohnsitz ,	Residence ,		
Staatsangehörigkeit 	Citizenship 		
Postanschrift 	Post Office Address 		

(Bitte entsprechende Informationen und Unterschriften im Falle von dritten und weiteren Miterfindern angeben).

(Supply similar information and signature for third and subsequent joint inventors).